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ABSTRACT

This study integrated three major areas in understanding children's and young adults' metamemory components, self-efficacy, implicit theories, and performance-predictions. These areas were examined in relation to a picture recall task which was performed children at three age levels. Further, empirically-based "start value" information regarding peers' performance was manipulated. Subjects were 45 5th-graders, 40 9th-graders, and 49 undergraduate college students. A few general conclusions were reached. First, those with stronger memory self-efficacy made higher predictions with greater confidence regarding initial memory task performance. However, self-efficacy was largely unrelated to memory task performance. Second, providing "start value" information affected initial predictions for performance on a memory task. However, subsequent predictions were more strongly related to performance on the previous trial than to the "start values" provided. Third, age was related to memory self-efficacy; younger children tended to have a stronger sense of self-efficacy than older students. Finally, a vast majority of those sampled believed that their memory abilities could change. In conclusion, a few suggestions for future research may be offered. However, questions remain regarding how knowledge utilization about performance occurs. Reasons for the lack of a relation between self-efficacy and performance should be investigated. Finally, researchers should attempt to understand children's implicit memory theories better.
(Author/ABL)

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RELATIONSHIPS AMONG SELF-EFFICACY, IMPLICIT THEORIES, MEMORY PREDICTIONS, AND MEMORY TASK PERFORMANCE

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RUNNING HEAD: RELATIONSHIPS

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ABSTRACT

This study integrated three major areas of research in understanding children and young adults' metamemory components--self-efficacy, implicit theories, and performance-predictions. These areas were examined in relation to a picture recall task which was performed by children at three age levels. Further, empirically-based "start value" information regarding peers' performance was manipulated. A few general conclusions were reached. First, those with stronger memory self-efficacy made higher predictions with greater confidence regarding initial memory task performance. However, self-efficacy was largely unrelated to memory task performance. Second, providing "start value" information affected initial predictions for performance on a memory task. However, subsequent predictions were more strongly related to performance on the previous trial than to the "start values" provided. Third, age was related to memory self-efficacy; younger children tended to have a stronger sense of self-efficacy than older students. Finally, a vast majority of those sampled believed that their memory abilities could change.

INTRODUCTION

This study integrated three major research areas in understanding children and young adults' metamemory components: self-efficacy, implicit theories, and performance-predictions. Bandura (1982, 1986) defined self-efficacy as a person's estimate of his or her own ability to perform certain actions needed to handle a task situation. Implicit theories refer to the degree to which a person views ability as either fixed or changeable (Cavanaugh & Green, 1990). Finally, performance prediction studies ask people to estimate a score before attempting the task. One goal of this investigation was to identify how self-efficacy and implicit theories are related to performance prediction, and how these relationships change over trials. Another goal was to extend the Hertzog et al. (1990) study in two ways: (1) by manipulating "start value" information based on empirical data regarding peers' performance, and (2) by examining children and young adults, rather than young adults and the elderly.

METHOD

Participants

The participants were 45 fifth graders, 40 ninth graders , and 49 Bowling Green State University undergraduates enrolled in the introductory psychology course. The fifth and ninth graders were primarily from the Bowling Green area, which is predominantly white and middle-class. Approximately equal numbers of males and females from

each grade level were randomly assigned to the four information conditions as described below. Also, numerous attempts were made to obtain equal numbers of students holding skill and entity theories (see later discussion regarding this point).

Measures

Memory Self-Efficacy Questionnaire. Memory self-efficacy was assessed with the Memory Self-Efficacy Questionnaire (MSEQ; Berry, West, & Dennehey, 1989), which describes eight memory tasks (e.g., remembering digits, pictures and maps) for which people assess their memory abilities. The MSEQ measures memory self-efficacy in two ways. First, people are asked if they would be able to recall specific numbers of items (e.g., 10 of 12 items) in a yes-no format; this is Self-Efficacy Level (SEL). Next, they indicate how confident they are about their *yes* judgments by circling a confidence level between 10% and 100% in 10% increments; this is known as Self-Efficacy Strength (SEST).

Memory Theories Instrument (Modified). Implicit memory theories were assessed by using Person & Wellman's (1987) Memory Theories Instrument (MTI), which was created to discover whether older people hold a skill or an entity view of memory, based on the work of Dweck & Leggett (1988). In the present study, the MTI was modified to make it more applicable to younger people.

For each of the seven items on the modified MTI, students selected one of two statements: one pertained to a skill view of memory; the other pertained to an entity view. Classification as a skill vs. entity theory was

determined by totaling the number of items in each theory endorsed; the theory endorsed most constituted one's implicit theory.

Memory Task. The memory task consisted of presenting each participant with a stack of thirty index cards, each containing a black-and-white line drawing of a common household or school item, such as scissors, clock, or shoes. The items used in the present study were selected to insure that they would be familiar to all participants.

Procedure for Main Study

Most participants participated individually in their school. Those not tested individually were tested in groups of two (i.e., with one other same-aged peer), with the children seated at separate tables. Students were encouraged to ask questions if they were unsure about the instructions pertaining to any aspect of the study. Clarifications were then provided as necessary. The order of measures was MTI, MSEQ, and the prediction and memory task.

The prediction aspect of the memory task was as follows. Immediately before the memory task, all participants were told that they would be given thirty cards to study for one minute, followed by two minutes to write down all of the pictures that they could recall. At this point, participants in three of the information level conditions were given "start values" based on the level of performance that was said to be typical for "most kids (people) your age": (1) a number that was one standard deviation higher than what their peers actually scored in the pilot study (Info1); (2) a number one standard deviation lower than what their peers

scored in the pilot study (Info2); or (3) the actual average score obtained by their peers (Info3). Participants assigned to the fourth information level condition received no information about how others performed (Info4). After the baseline information listed above was provided, participants predicted their performance, as well as how certain they were that they would remember that many items. To accomplish this, participants were asked to write down how many of the thirty pictures they believed they would be able to remember. To assess confidence, participants were told to estimate their confidence level to the nearest multiple of ten percent (i.e., 10%, 20%, 30%, etc.).

After the prediction and confidence measures were obtained, participants performed the memory task, in which they were provided one minute to examine the thirty pictures at their own pace. After this minute, participants returned the cards to the experimenter and were given two minutes to write down as many of the objects as they could remember. On each trial, scores for this task were determined by totaling the number of pictures correctly recalled. A total of three prediction (referred to as Pred1, Pred2, and Pred3), confidence (referred to as Conf1, Conf2, and Conf3), and recall trials (referred to as Perf1, Perf2, and Perf3) were completed; however, the baseline information was only provided prior to trial one. After completing all three trials, participants were debriefed about the experiment.

RESULTS

Two points need to be made about the data. First, 94% of those sampled held skill implicit memory theories as measured by the MTI. Despite additional efforts to identify individuals holding entity theories, none could be located. Due to the small number of people holding entity theories, these people were dropped from the analyses. Next, only results significant at the .05 level will be discussed.

Self-Efficacy. As expected, overall SEL and SEST were significantly related at each grade level (.35 for fifth graders, .55 for ninth graders, and .30 for college students). Interestingly, self-efficacy was not correlated with task performance for any of the three age groups.

For fifth graders, SEL correlated with predictions on trials one (r = 41) and two (r = 34). SEST significantly correlated with confidence level on each trial of the memory task (r = .60, .42, and .38, respectively).

For ninth graders, SEL correlated with initial predictions (r = 42) and confidence levels (r = 52). For these participants, SEST was correlated with predictions on each memory task trial (r = .54, .36, and .38, respectively). SEST was also correlated with confidence level for the first two memory task trials (r = .64, and .36, respectively). For college subjects, SEL was related to initial predictions (r = .54).

Implicit Theories. The only two significant correlations involving implicit theories were both in the ninth grade sample. Level of skill implicit theory was related to self-efficacy level (r = .36) and to trial two memory task performance (r = .36).

Memory Task Prediction, Confidence, and Performance. Although fifth graders obtained no significant correlations between prediction and performance, ninth graders obtained significant correlations between prediction and performance for trials two (r = .58) and three (r = .56). Also, previous performance was related to subsequent predictions for the last two memory task trials (r = .68 for each).

Similarly, college students' predictions and performance were related on trials two (r = .36) and three (r = .56). Also, previous task performance was related to subsequent predictions for the later trials (r = .42 and .68, respectively).

Information-Type Manipulation Analyses

In order to examine the data within each grade, separate 4 (information level) X 3 (trials) ANOVAs were performed to examine the effects of information condition on prediction, confidence, and memory task performance. Information condition affected fifth graders' initial predictions (F (3, 36) = 4.13, p < .05), where children given a "start value" that was too high (Info1) and children who were given no information (Info4) made significantly higher predictions than those who were given a "start value" that was too low (Info2) (see Figure 1). However, "start value" information did not affect later predictions, confidence levels, or task performance.

For ninth graders, only one significant effect was found (see Figure 2). Participants in the various information conditions obtained significantly different confidence levels on the third trial of the memory task (F (3, 33)

= 4.50, $p < .01$); participants in the no information condition had more confidence in their final predictions (85.6%) than those in the too low information condition (65.0%).

Information condition affected performance predictions for college students on both trials one ($F(3, 45) = 3.86$, $p < .05$) and two ($F(3, 45) = 3.60$, $p < .05$), but by trial three performances were equivalent across conditions (see Figure 3). Post-hoc comparisons showed that for the first two trials, subjects in the too high information condition (Info1) predicted they would recall significantly more pictures than those in the too low (Info2) condition. Information condition did not affect either confidence levels or task performance for the college subjects.

DISCUSSION

Three general conclusions may be drawn from the results of the present study. First, individuals with stronger memory self-efficacy made higher predictions with greater confidence regarding initial memory task performance; however, self-efficacy was unrelated to performance. Second, relationships among prediction, confidence, and performance varied over trials. Third, "start value" information about peer performance affected participants' initial predictions inconsistently across age groups. Also, this effect was short lived; for the most part, subsequent predictions were more strongly related to previous trial performance than to the "start values" provided.

Self-Efficacy

Overall, self-efficacy was inconsistently related to prediction and confidence scores, but not with the memory task performance measures. These findings partially support previous research with older adults that found inconsistent correlations between pretest self-efficacy measures and task performance across tasks. Other researchers (see Schunk, 1989), however, have demonstrated a more consistent relation between self-efficacy and performance.

The present study found non-significant correlations between self-efficacy and memory task performance. These results differ from those of others (e.g.; Hertzog et al., 1990) who found strong, positive correlations between self-efficacy and task performance. One reason for this difference could be due to differences in self-efficacy measurement across studies. Bandura (1989) noted that self-efficacy may be measured either within a specific domain (e.g., memory) or regarding a specific task (e.g., predictions regarding performance on a given memory task). The present study differed from other studies in that both were measured. Another possible reason for the difference between the present study's findings and others (e.g., Hertzog et al., 1990) is the participants' younger ages. Thus, young children may not evaluate their memory in the same way as older adults.

Prediction And Performance

Three general points can be made regarding the performance-prediction relation. First, although trial1 correlations between the two

were nonsignificant, subsequent trials showed increasing correlations between same trial prediction and performance for the older groups. Thus, over trials, people became better estimators of their performance levels. Second, both ninth graders and college students had high correlations between previous performance and immediately subsequent trial predictions. Thus, older students apparently were able to monitor their prior performance successfully in order to estimate their next performance better. Third, the present study showed significant correlations among predictions, confidence levels, and performance levels over trials.

Information Manipulation

Regarding presentation of peer information, this study indicated that "start values" significantly affected fifth graders' and college students' initial memory task predictions. After the first trial, however, one's own task performance seemed to have a greater influence on predictions made by the present study's older subjects.

Future Research

In conclusion, a few suggestions for future research may be offered. First, when people have limited knowledge about their ability, this study found that people tend to utilize information about others' performance to estimate their own performance level. However, after attempting the task, older children and young adults appear to use knowledge about their performance to estimate future performances. However, questions remain

regarding how this knowledge utilization occurs, which parameters govern it, and how it develops.

Also, reasons for the lack of relation between self-efficacy and performance should be investigated. Cavanaugh and Poon (1989) raise the issue of reactivity as a factor. As yet, there has not been a systematic examination of order effects among self-efficacy, metamemory, and performance assessments.

Finally, researchers should attempt to understand children's implicit memory theories better. More sensitive instruments specifically designed to assess school-aged children's and young adults' implicit theories in this and other domains need to be devised. In this regard, researchers may wish to discard the notion of dichotomizing implicit theories into two separate groups; instead, implicit theories could be thought of as a set of beliefs existing along a continuum. Currently, we (Cavanaugh, Baskind, & Suttman, in progress) are exploring this issue. Clearly, the measurement problems precluded finding the hypothesized correlations between implicit theories and other variables. Indeed, addressing the measurement issue will force researchers to show that implicit memory theories are distinct from self-efficacy beliefs and other aspects of metamemory. Also, a longitudinal study of implicit memory theories should be conducted to increase knowledge regarding the development of implicit theories.

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Figure 1

5th Graders' Data

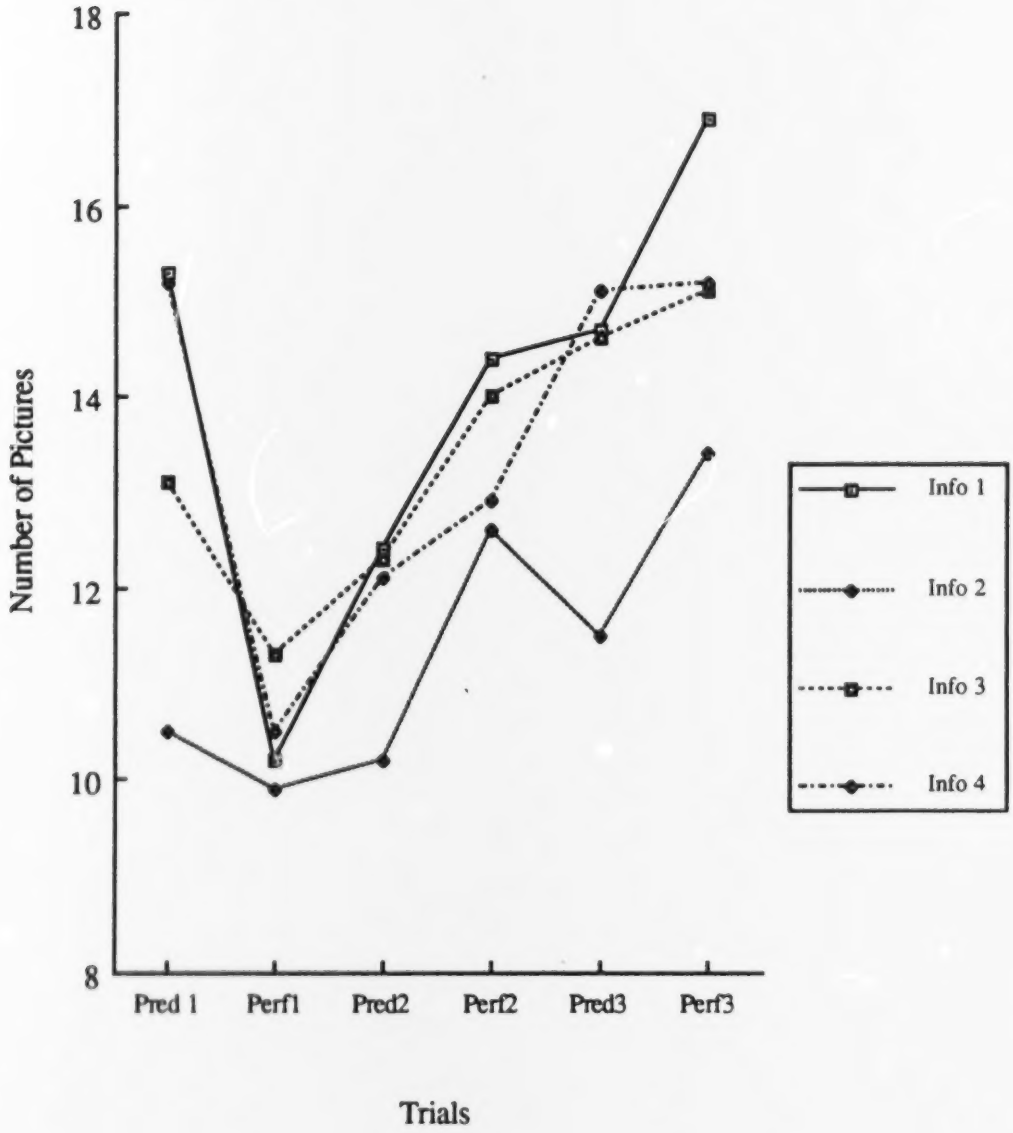

Figure 2

9th Graders' Data

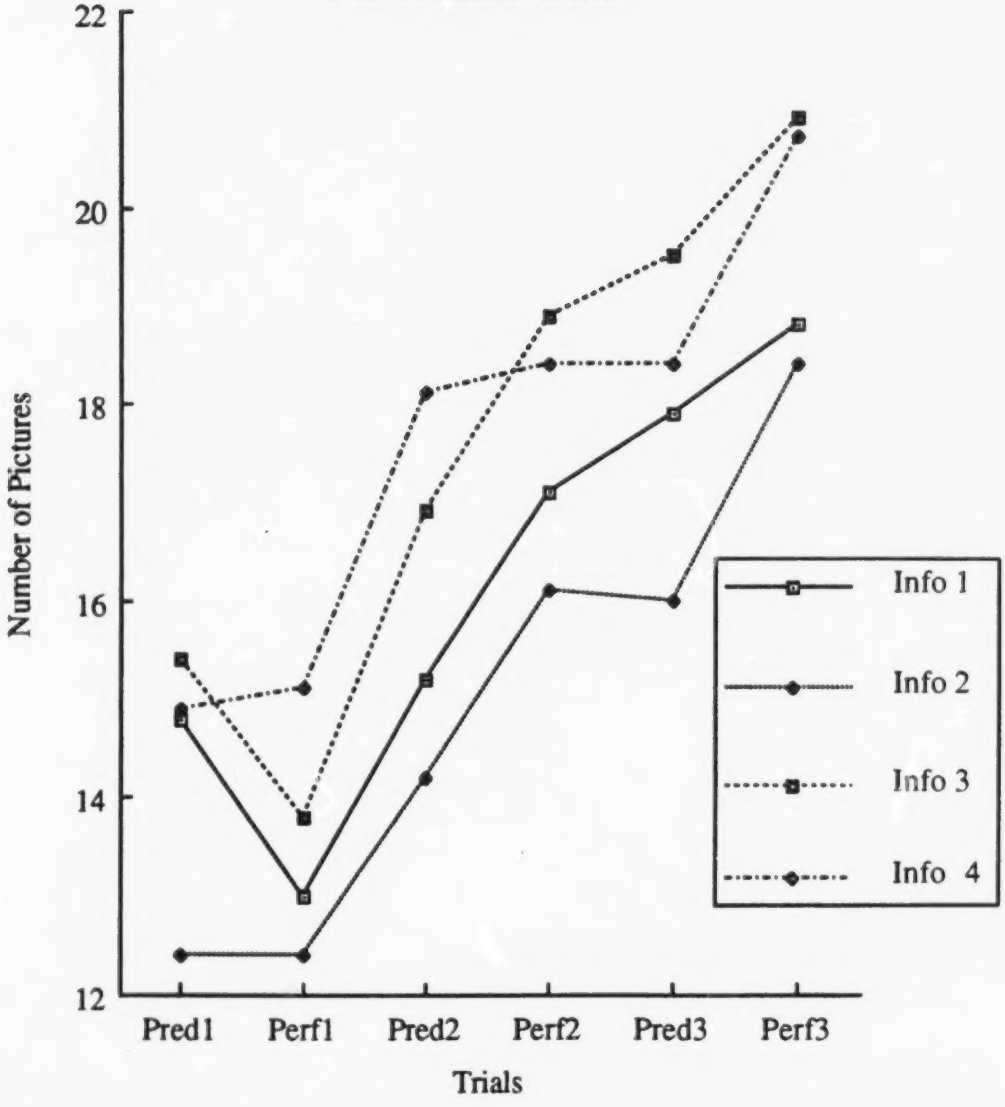

Figure 3

College Students' Data